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Hillside Terraces or Ditches

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RALEIGH, N. C.

HILLSIDE TERRACES OR DITCHES.

By F. E. EMERY, Agriculturist.

The proper handling of water on a farm is of very great importance. The value of an abundant supply of water to growing crops, and the injury produced by an excess, are often the controlling factors in crop production. Different methods of handling this water must be practised under the widely varying conditions which prevail in different sections, and with the very wide range of soils, and the topography of each. In general, on our hillsides where the soil particles are fine, great care must be given to ease down the rainfall in order to prevent the soil from being carried down with it, and thus produce unsightly galled and gullied areas, at once disheartening and expensive to reclaim. (See Plate 1.) Under-drains are suitable to some localities, but even with these, furrows are often necessary to hold the soil, when, as often happens, an inch or two of water may be poured down in a single shower or storm of longer duration.

Hillside ditches are often made, but they are soon fringed with an uncultivated weedy strip, harmful to the rest of the field, in addition to the waste of land and their unsightly appearance. They are also impassable to wagons and farm machinery which must be brought into more frequent use on North Carolina farms.

Confronted with the competition of recent years, and the necessity of adopting more intensive methods of farming with increasing use of farm machinery, Mr. P. D. Mangum, of Wake Forest, N. C., originated a method of terracing which has improved his land, and enabled him to use modern implements. After using the method for ten years since 1885, the result has been so satisfactory that it is being adopted and used by a large number of farmers who have visited his farm to inspect his "terraces" and learn how to construct them.

It may be safely stated that the popularity of these terraces is the pride of the town. This pride is well placed, too, for the water falling on fields well terraced, is so well handled that improvement begins at once. No water is allowed to "run" and begin to "cut" or denude any part of the field, and the grading is so evenly arranged that the soil water must always be moving through the soil, either with the slope of the hillside, or following the winding of the terrace toward the bottom in a more circuitous route. The terracing is done so that a plow, drill, reaper, rake, mower, or wagon can be driven safely over the field and the whole cultivated as

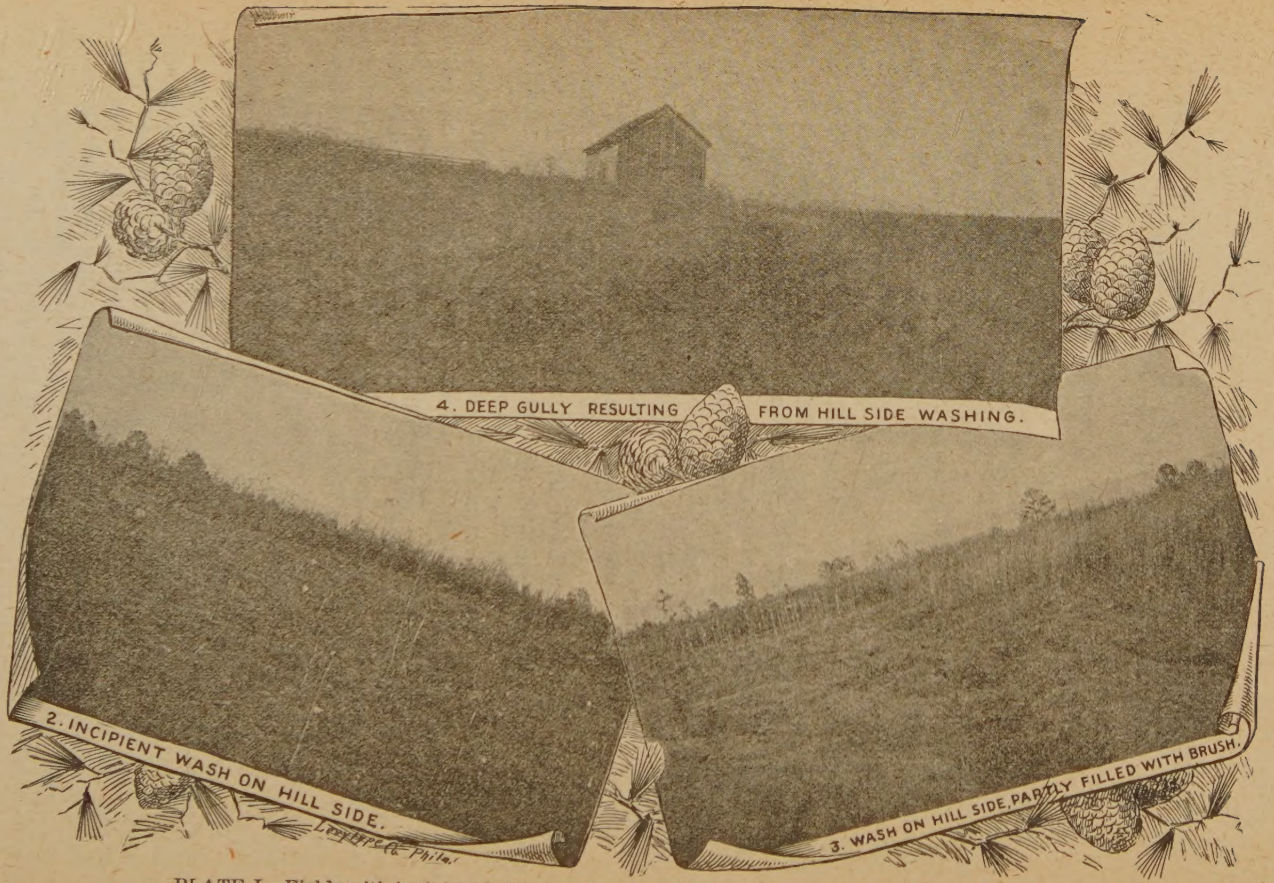

PLATE I.—Fields with incipient hillside washes, and deep gullies caused by incomplete ditching.

neatly as the most fastidious farmer might desire. Mr. Mangum's fields are patterns of clean culture, and the history of each one, under the new system, is one of increasing production with decreasing cost.

The observer may find the same kind of terracing in other localities and counties now (see Plate II), but nowhere else can there be found so enthusiastic an advocate as in the originator, who has seen his crops increase with the better provision for the distribution of rainfall, while the risk of serious damage from heavy showers and storms has diminished materially.

The method of making these terraces is, first to lay off a line rising from where the outlet of the terrace is to be, at an easy regular rate, so that the water will not run in the ditch or hollow which is prepared, and then plow out and finish with a level and hand tools.

The Leveling Instrument.

The Leveling Instrument (figure 1) will be first described, after which the construction of the terrace will be given. The instrument is a light, handy one, used in making the grade and locating the position of the terraces on the hillside. The most convenient instruments are such as have an even aliquot part of 100 feet for the spread of the legs or sides at the bottom. For convenience, the following description is for one which spans ten feet from outside to outside at the bottom. The wood must be light, well seasoned and straight, and free from tendency to warp. The legs should be cut on an angle of 45 degrees, and just 7 feet $\frac{5}{16}$ inch long on the out or longer side. When the cuts are joined evenly, the ends should rest on the ground or a floor, evenly, and just ten feet apart from outside to outside. The pieces may be 1 x 4 or 1 x 5 inches, dressed on four sides. A strip of wood to hold the top firmly together should be put on with screws. The cross bar should also be fastened with screws. It should be placed at the same distance from the top on each side so that it will be level when the instrument stands on a level floor. A saw cut in the top between the two sides will hold a plumb line, which, when the weight is attached and the instrument is set level, marks the middle point of the cross piece, if the measurements have been correctly made and the whole put together properly. Mark the middle point "0." Now, instead of using the

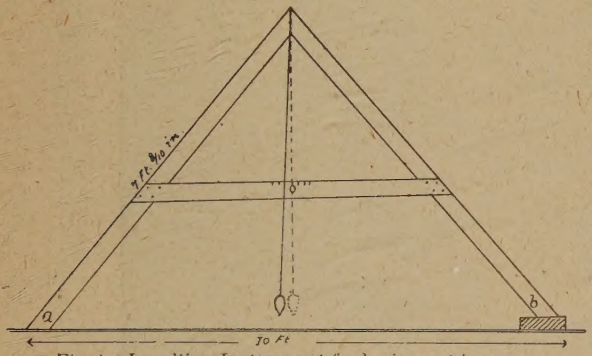

Fig. 1.—Levelling Instrument for laying out terraces.

PLATE II.—A Mangum Hillside Terrace on the farm of The N. C College of Agriculture and Mechanic Arts. Crops are planted and cultivated upon the terrace.

plumb line for work, it is better, because wind affects the line, to use another device. Make a thin, light piece of wood, using, if desired, a piece cut from the cross-bar, or one of the legs, if it has length enough to reach from the top down over the cross-bar. Bolt it to the top of the instrument so that it will swing freely, observing to bore the bolt hole in the centre and also in the top of the instrument where the plumb line crossed it. When this tongue is bolted on, cut out a narrow opening in it just in front of the cross-bar so the "0" mark can be seen when the instrument stands level. A small iron carpenter's level, costing about 15 cents, can now be set into the tongue so the bubble in it will stand under the middle line when the instrument is on a level floor, and the "0" mark shows through the tongue when it hangs freely and at rest. Now it is ready to be graduated, i. e., to so place the marks by which it may be known how much fall is being given a terrace for every 100 feet of its length. Our instrument is ten feet wide, or just one-tenth of one hundred. If we raise one leg on a block one inch high it gives a rise of one inch in ten feet, which multiplied by ten gives ten inches for every one hundred feet. It may be best to make the graduations with a fine plumb line and quite a heavy weight. First fix the "0" mark accurately; then raise one leg on a two-inch block and mark the point where the line crosses the cross-bar with a fine pencil mark. Divide the space from "0" to the line into four equal ones By raising one leg two inches the high grade of 20 inches to 100 feet has been fixed. Dividing the space into four parts fixes a line on the bar for a grade of 5, 10, 15 and 20 inches per 100 feet, and these lines may be thus marked. A similar space on the opposite side of the "0" may be laid off and marked in the same way, and then either side may be used, or the other side may be graduated for different grades.

In cutting out the peep-hole on the tongue through which to see the "0" or grade mark, it will be well to observe the following precaution: Mark the middle of the tongue on both sides with a pencil for a space longer than the cross-bar is wide. Bore out a little of the middle of these lines in which to insert a small saw; then saw out the middle lines up and down to the width of the cross-bar or more. Bore more holes near the ends of the saw, cut and take out a round or oval piece of the tongue. Stretch a string across from saw cut to saw cut; or fit a thin, narrow, but straight piece of metal across the opening so it will cover the "0" line when the instrument stands level.

If desired, a larger instrument to span 12½ or any desired number of feet may be constructed in the same way. The width in feet should be made an even divisor of one hundred, which will save time in calculations, and be easier to use.

Laying off the Terrace.

In order to explain more easily the use of the level and grade of

a terrace, a drawing (figure 2) is here introduced. This represents a field which needs to be terraced. Dotted lines, called *contour lines*, have been drawn to show levels twenty inches apart vertically, that is, if one were to walk the whole length of one line he would neither go up nor down, but would go in and out on that level according to whether there were prominent places or hollows. Then if a twenty-inch rule were set up straight on one dotted line, its top would be just level with the next line above. By the crossing of the solid "terrace" lines over the dotted lines in the figure, one may see more plainly the progress which is being made. It is

Fig. 2.—A hill to be terraced, showing contour lines and location of terraces.

desired to direct the water toward the run on the left. The distance the terraces should be located from each other, depends on several conditions: the kind of soil, its depth and fineness, the steepness of the hillside, and the amount of rainfall which may be expected, rather than upon any fixed rules.

In figure 2, the lines of terraces have been run upward to the right from points a, b, c and d. This shows that starting with an instrument set to rise 10 inches for every 100 feet, the vertical distance between the contour lines is traversed in two hundred feet of the terrace. The water is carried off by each terrace in the simplest manner by making each one start at the points named above. If, however, it is desired to hold the water which falls on the land for a longer time, then when terrace a-g has been laid off, turn about and run up from "g" to "f-c," making a terrace "c-f-g," down which water must pass to reach the first terrace "g-a." In the

same way, starting again at "f" and laying off a terrace to "e" carries the water back down the hill in an easy zigzag direction, which allows for the greatest amount of soakage through the soil. No harm can be done at any point, because the grades, during the whole of their course, are so even that the water passes from point to point so gradually that its denuding effect is never felt.

After laying off a terrace and looking back over it, the stakes left to mark the course will be seen to be a very broken line. It will be well to go back over it and move in those too far out of the general curves on either side. It is good practice to take up the stakes to be used again, and the line of the terrace may be indicated by stiff broom straws, a handful of which is taken for the purpose when the line is to be evened up for the plow.

Forming the Terrace.

With a small plow and one mule turn two furrows, one up and the other down, on the line indicated by the broom straws. Now a heavier plow and team may be used and eight or ten furrows plowed on each side toward the first, which is to be the embankment of the terrace when completed. The work may now be advanced by plowing on the upper side only, as shown by the drawings* (see figure 3), except that more earth will be removed in this case than is there shown, and the bank made higher when the terrace is finished. A side-hill plow to work back and forth on the same strip should be used, but turning the soil every time one furrow toward the bank of the terrace. When the plow has been used as much as is desirable, the work may be finished by hand labor. Use a level, and shovel out enough of the plowed soil from the upper side on to the bank to make a level about ten feet wide. (See "c," figure 4). The terrace is complete when this leveling has been

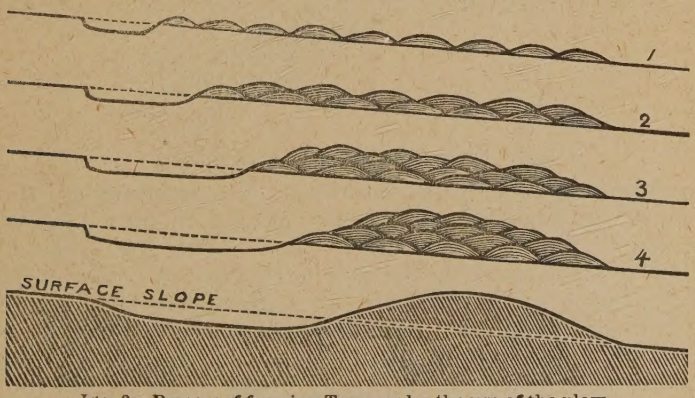

Fig. 3.—Process of forming Terraces by the use of the plow.

*From N. C. Experiment Station Bulletin 71.

done. The terrace is kept up and strengthened each year by making the bank the back furrow every time the field is plowed.

In planting, the rows are run diagonally across each terrace and just steep enough, so that if there is any water to run it will follow the row instead of crossing from row to row. Water is discharged from row to terrace toward the top, or up hill rather than down. Therefore the steepness of the hillside, and tendency of the soil to

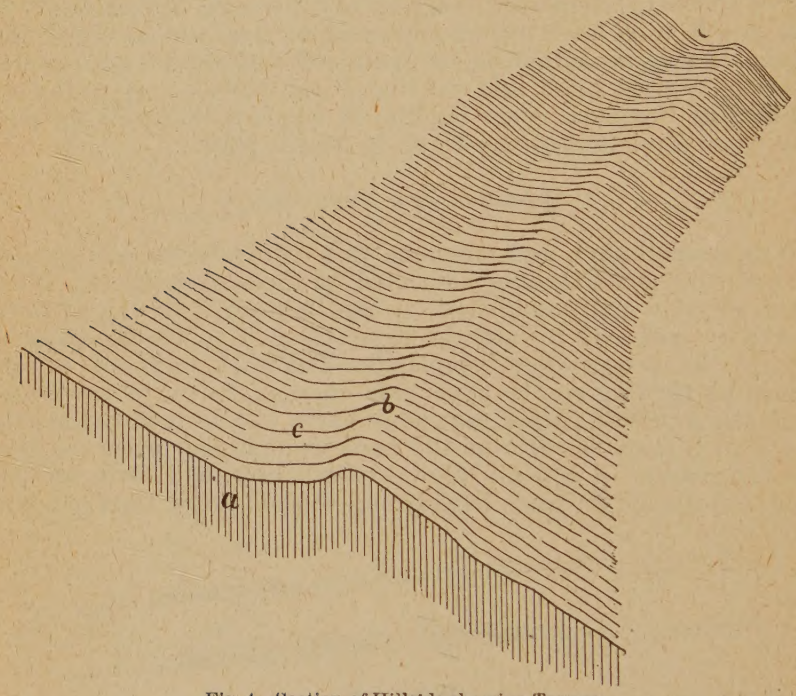

Fig. 4.—Section of Hillside showing Terrace.

wash, determines the slope of the rows. The tendency all the time should be to deepen the soil by thoroughness in plowing, and thus further retard the flow of water. Care should be taken to add something to the humus in the soil each year, and also to plow a little deeper each time until there is a sufficient depth of soil to take up and hold the water from a sudden heavy shower or a long storm, and ease it down to the outlets of the terraces with no appearance of water on the surface to threaten a break anywhere in the field.

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